

JEFFERSON COLLEGE

COURSE SYLLABUS

BIO116

Anatomy & Physiology for Pre-Hospital Healthcare

3 Credit Hours

**Prepared by:
Dr. Cecil M. Hampton**

**Revised by:
Ms. Deborah Allen
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**Arts and Science Education
Dr. Mindy Selsor, Dean**

BIO116 ANATOMY & PHYSIOLOGY FOR PRE-HOSPITAL HEALTHCARE

I. CATALOGUE DESCRIPTION

Prerequisite: None
3 semester hours credit

Anatomy & Physiology for Pre-Hospital Healthcare covers vital human bodily functions and associated structure. An overview of cells, tissues, organs and organ systems and their correlation to normal physiology is emphasized. Interactions of organ systems are also explored. (Su)

II. GENERAL COURSE OBJECTIVES

The primary objective of this course is to focus on cellular function, airway structure and function, alveolar respiration and blood gas, organization of the central and autonomic nervous system, cardiovascular function and heart electrical conduction, renal function, and the role of fluids and electrolytes in maintaining homeostasis.

III. COURSE OUTLINE (COURSE CONTENT WILL BE DRAWN FROM THIS)

- A. Introduction to Anatomy and Physiology
- B. Cell Physiology
- C. Nervous and Endocrine Systems
- D. Cardiovascular System
- E. Respiratory System
- F. Digestive System
- G. Excretory System

IV. UNIT OBJECTIVES

- A. Introduction to Anatomy and Physiology
 1. Define anatomy, physiology, and pathophysiology.
 2. Name the levels of organization of the body and explain each.
 3. Name the organ systems of the body.
 4. Define homeostasis and give examples of a typical homeostatic mechanism.
 5. Describe the anatomical position.

6. Describe the sagittal, midsagittal, transverse and frontal planes.
7. Use proper terminology to describe the location of body parts with respect to one another.
8. Name the body cavities, their membranes and some organs within each cavity.
9. Explain the four quadrants of the abdomen and name the organs in those areas.
10. Define matter, element, atom, proton, neutron, and electron.
11. Using symbols, name some common elements found in the body.
12. Describe the purpose of ionic, covalent and hydrogen bonds in the body.
13. Describe what happens in synthesis and decomposition reactions.
14. Explain the importance of water to the function of the body.
15. Describe where water is found in the body.
16. Describe the four major categories of tissues and give general characteristics of each.
17. Describe the function of epithelial tissue depending on their location.
18. Describe the function of connective tissue and relate them to the function of the body or an organ system.
19. Explain the basic differences between smooth, skeletal and cardiac muscle.
20. Describe in brief nervous systems.
21. Name the organs made of nerve tissue.
22. Describe the location of pleural membranes, pericardial membranes, and perineummesentery.
23. State the location of mucous membranes and state the function of mucus.
24. Name some membranes made of connective tissue.

B. Cell Physiology

1. Explain the roles of oxygen and carbon dioxide in cell respiration.
2. Explain pH and state normal pH ranges in body fluids.
3. Explain how a buffer system resists major pH changes.
4. Describe the functions and types of sugars, fats, and proteins.
5. Explain how enzymes function as catalysts.
6. Describe the function of DNA, RNA and ATP.
7. Name the organic molecules that make up the cell membrane and state their functions.
8. State the arrangement of the molecules in the cell membrane.
9. State five functions of proteins in the cell membrane.
10. Describe the cytoplasm.
11. Describe how the cell membrane regulates the composition of the cytoplasm.
12. Explain isotonic, hypotonic, and hypertonic solutions and their effects on the cell.
13. State the function of the nucleus and chromosomes.
14. Describe the function of the cell organelles.

15. Define each of these cellular transport mechanisms and give an example of the role of each in the body: diffusion, osmosis, facilitated diffusion, active transport, filtration, phagocytosis and pinocytosis.
16. Describe what happens in mitosis and meiosis and describe the importance of each.

C. Nervous and Endocrine Systems

1. Explain polarization, depolarization and repolarization in terms of ions and charges.
2. Name the divisions of the nervous system and state the general functions of each.
3. Name the parts of a neuron and the function of each.
4. State the functions of the parts of the brain and locate each part on a diagram.
5. Name the meninges and describe their locations.
6. State the locations and functions of cerebrospinal fluid.
7. Explain the general purpose of sensations.
8. Explain the importance of proprioception, or muscle sense.
9. Name the parts of the eye and explain their function in sight.
10. Name the parts of the ear and explain their function in hearing.
11. Distinguish between endocrine and exocrine glands.
12. Identify the primary endocrine glands and list the major hormones secreted by each.
13. Describe the relationship between insulin and glucagon.

D. Cardiovascular System

1. Describe the primary function of blood.
2. List the formed elements of blood and state the primary functions of each.
3. Explain the ABO and Rh blood types.
4. State what platelets are and explain how they are involved in hemostasis.
5. Describe the three stages of blood clotting.
6. Describe the location of the heart in terms of blood cavities and relationship to other structures.
7. Name the chambers of the heart and the vessels that enter or leave each.
8. State the valves of the heart and their function.
9. State how heart sounds are created.
10. Trace the pathway of a blood cell throughout the body.
11. Describe coronary circulation.
12. Describe the cardiac conduction pathway and its relationship to a normal electrocardiogram.
13. Explain stroke volume, cardiac output, and Starling's law of the heart.
14. Explain how the nervous system regulates the function of the heart.
15. Describe the structure and function of each of the blood vessels: arteries, veins, and capillaries.
16. Describe the exchange of gases that occur at the capillary level.

17. Describe the circulation within the lymphatic system and the role of the lymph nodes.
18. State the location and function of the spleen.
19. Explain the importance of hemoglobin and myoglobin and oxygen debt and lactic acid.

E. Respiratory System

1. Name the energy sources for cellular work and state the simple equation for cell respiration.
2. State the general function of the respiratory system.
3. State the pathway of the respiratory system including nasal cavities, pharynx, and larynx.
4. State the changes in air pressure within the thoracic cavity during respiration.
5. Explain the diffusion of gases in external and internal respiration.
6. Describe how oxygen and carbon dioxide are transported in the blood.
7. Explain the nervous and chemical mechanisms that regulate respiration.
8. Explain how respiration affects the pH of certain body fluids.

F. Digestive System

1. Describe the general function of the digestive system and name the major divisions.
2. Describe the location and function of the pharynx and esophagus.
3. State the normal range of body temperature.
4. Define metabolism, catabolism, and anabolism.
5. State the different ways heat is generated and lost in the body.
6. State why the hypothalamus is the thermostat of the body.
7. State the products of cell respiration and how the body disposes of them.
8. Describe the metabolic roles of fats, glucose, and proteins.

G. Excretory System

1. Describe the location and general function of each organ in the urinary system.
2. Name the parts of a nephron.
3. Define glomerular filtration rate.
4. Describe how the kidneys function in maintaining normal blood volume and pressure.
5. Describe how the kidneys help to maintain normal blood pH and electrolyte balance.

V. METHOD(S) OF INSTRUCTION

A. Lectures

- B. Classroom Demonstrations
- C. Homework Assignments
- D. Computer Labs
- E. Lab Assignments

VI. REQUIRED TEXTBOOK(S) WITH PUBLICATION INFORMATION

Martini. Human Body in Health and Disease. Pearson Education (Prentice Hall).

VII. REQUIRED MATERIALS (STUDENT)

None.

VIII. SUPPLEMENTAL REFERENCES

None.

IX. METHOD OF EVALUATION (STUDENT)

- A. Written Exams
- B. Homework Assignments
- C. Quizzes
- D. Laboratory Exercises
- E. Comprehensive Written Exam